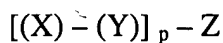
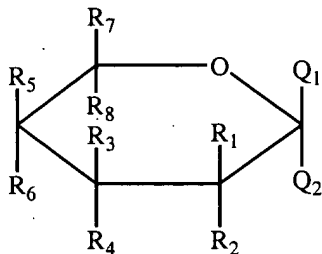


1. A composition comprising:
2 a compound having the formula:



- 4 where X is



- 6 where Q1 and Q2 are each independently H, a bond to Y, or a bond to Z, where at
least one of Q1 or Q2 is a bond to Y or a bond to Z; where R1, R4, R6 and R8 are
8 each H; R2, R3, and R5 are each independently OH, OSO3D, or OPO3D, and R7 is
CH2OH, CH2OSO3D or CH2OPO3D; where D is H or a cation selected from the
10 group consisting of: alkali metal cations, alkaline earth metal cations, ammonium
cations, quaternary ammonium cations and amine cations; and where at least one of
12 R2, R3, R5 and R7 is a sulfur or phosphate containing group;
where Y is an optional linker, Z is a multivalent support, and p is an integer in the
14 range of 1-2000 inclusive.

2. The composition of claim 1 where p is 2- 2000 inclusive, and where at least
2 one of R2, R3, R5 and R7 on each X independently is a sulfur or phosphate containing
group.

3. The composition of claim 1 where p is 3- 525 inclusive, and where at least
2 one of R2, R3, R5 and R7 on each X independently is a sulfur or phosphate containing
group.

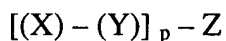
4. The composition of claim 1 having an average of 1-4 sulfur or phosphate
2 containing groups per moiety X.

5. The composition of claim 1 having an average of 2-3 sulfur or phosphate
2 containing groups per moiety X.

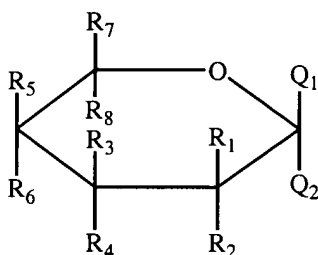
6. The composition of claim 1 wherein Z is a dendrimer.

7. The composition of claim 1 wherein Z is selected from the group consisting
2 of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and
combinations thereof.

8. A composition comprising:
2 a compound having the formula:



4 where X is



6 where Q1 and Q2 are each independently H, a bond to Y, or a bond to Z, where at
least one of Q1 or Q2 is a bond to Y or a bond to Z; where R1, R4, R5 and R8 are each H;
8 R2, R3, and R6 are each independently OH, OSO3D, or OPO3D, and R7 is CH2OH,
CH2OSO3D, CH2OPO3D; where D is H or a cation selected from the group consisting of:
10 alkali metal cations, alkaline earth metal cations, ammonium cations, quaternary ammonium
cations and amine cations; and where at least one of R2, R3, R6 and R7 is a sulfur or
12 phosphate containing group; where Y is an optional linker, Z is a multivalent support, and p
is an integer in the range of 1-2000.

9. The composition of claim 8 where p is 2-2000 inclusive and where at least
2 one of R2, R3, R6 and R7 on each X independently is a sulfur or phosphate containing

group.

10. The composition of claim 8 where p is 3- 525 inclusive and where at least one
2 of R2, R3, R6 and R7 on each X independently is a sulfur or phosphate containing group.

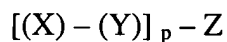
11. The composition of claim 8 having an average of 1-4 sulfur or phosphate
2 containing groups per moiety X.

12. The composition of claim 8 having an average of 2-3 sulfur or phosphate
2 containing groups per moiety X.

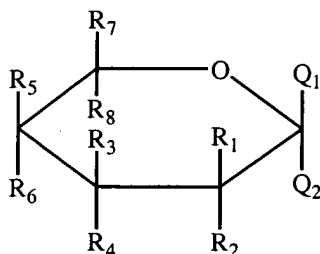
13. The composition of claim 8 wherein Z is a dendrimer.

14. The composition of claim 8 wherein Z is selected from the group consisting
2 of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and combinations thereof.

15. A composition comprising:
2 a compound having the formula:



4 where X is



6 where Q1 and Q2 are each independently H, a bond to Y, or a bond to Z, where at
least one of Q1 or Q2 is a bond to Y or a bond to Z; where R1, R2, R3, R4, R5 and R6 are
8 each independently H, OH, COOH, sialic acid, OSO3D, or OPO3D; R7 and R8 are each

independently H, OH, COOH, sialic acid, CH₂OH, CH₂OSO₃D, CH₂OPO₃D, OSO₃D, or
10 OPO₃D, where D is H or a cation selected from the group consisting of: alkali metal cations,
alkaline earth metal cations, ammonium cations, quaternary ammonium cations and amine
12 cations; and where at least one of R₁, R₂, R₃, R₄, R₅, R₆, R₇ and R₈ is a sulfur or
phosphate containing group; where Y is an optional linker, Z is a multivalent support, and p
14 is an integer in the range of 1-2000.

16. The composition of claim 15 where p is 2-2000 inclusive and where at least
2 one of R₁, R₂, R₃, R₄, R₅, R₆, R₇ and R₈ on each X independently is a sulfur or phosphate
containing group.

17. The composition of claim 15 where p is 3- 525 inclusive and where at least
2 one of R₁, R₂, R₃, R₄, R₅, R₆, R₇ and R₈ on each X independently is a sulfur or phosphate
containing group.

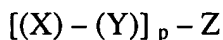
18. The composition of claim 15 having an average of 1-4 sulfur or phosphate
2 containing groups per moiety X.

19. The composition of claim 15 having an average of 2-3 sulfur or phosphate
2 containing groups per moiety X.

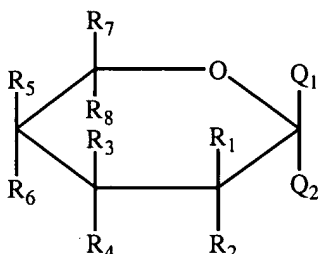
20. The composition of claim 15 wherein Z is a dendrimer.

21. The composition of claim 15 wherein Z is selected from the group consisting
2 of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and
combinations thereof.

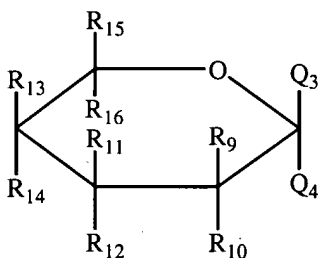
22. A composition comprising:
2 a compound having the formula:



4 where X is



6 where Q1 and Q2 are each independently H, a bond to Y, or a bond to Z, where at least one
of Q1 or Q2 is a bond to Y or a bond to Z; where the bond to Y is a bond to an atom selected
8 from the group consisting of: S, P, N, or C; where R1, R2, R3, and R4 are each
independently H, OH, COOH, sialic acid, a saccharyl group, OSO3D, or OPO3D; where R7
10 and R8 are each independently H, CH2OH, COOH, sialic acid, a saccharyl group,
CH2OSO3D, CH2OPO3D, OSO3D, or OPO3D; where R5 and R6 are each independently
12 H or a saccharyl group having the formula:



14 where one of the variables Q3 and Q4 is O and the other is H; where R9, R10, R11,
R12, R13 and R14 are each independently H, OH, COOH, sialic acid, a saccharyl group,
16 OSO3D, or OPO3D; where R15 and R16 are each independently H, OH, COOH, sialic acid,
a saccharyl group, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or OPO3D; where D is H
18 or a cation selected from the group consisting of: alkali metal cations, alkaline earth metal
cations, ammonium cations, quaternary ammonium cations and amine cations; where at least
20 one of R1, R2, R3, R4, R5, R6, R7, R8 R9, R10, R11, R12, R13, R14, R15 and R16 is a
sulfur or phosphate containing group; and where Y is an optional linker, Z is a multivalent
22 support, and p is an integer in the range of 1-2000.

23. The composition of claim 22 where p is 2-2000 inclusive and where at least
2 one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.

24. The composition of claim 22 where p is 3- 525 inclusive and where at least
2 one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.

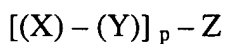
25. The composition of claim 22 having an average of 1-4 sulfur or phosphate
2 containing groups per moiety X.

26. The composition of claim 22 having an average of 2-3 sulfur or phosphate
2 containing groups per moiety X.

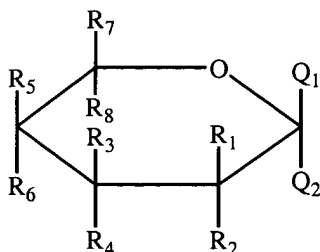
27. The composition of claim 22 wherein Z is a dendrimer.

28. The composition of claim 22 wherein Z is selected from the group consisting
2 of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and
combinations thereof.

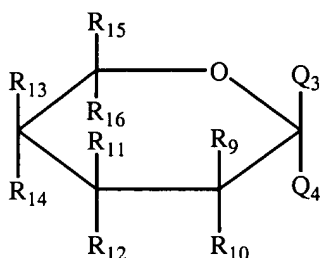
29. A composition comprising:
2 a compound having the formula:



4 where X is



6 where Q1 and Q2 are each independently H or a bond to Y, where at least one of Q1
or Q2 is a bond to Y; and where R1, R2, R3, and R4 are each independently H, OH, COOH,
8 sialic acid, a saccharyl group, OSO3D, or OPO3D; R7 and R8 are each independently H,
COOH, sialic acid, a saccharyl group, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or
10 OPO3D; and R5 and R6 are each independently H or a saccharyl group having the formula:



12 where one of the variables Q3 and Q4 is oxygen and the other is H; and where R9,
R10, R11, R12, R13 and R14 are each independently H, OH, COOH, sialic acid, a saccharyl
14 group, OSO3D, or OPO3D; and R15 and R16 are each independently H, OH, COOH, sialic
acid, a saccharyl group, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or OPO3D; where D
16 is H or a cation selected from the group consisting of: alkali metal cations, alkaline earth
metal cations, ammonium cations, quaternary ammonium cations and amine cations; and
18 where at least one of R9, R10, R11, R12, R13, R14, R15 and R16 is a sulfur or phosphate
containing group; and where Y is an optional linker, Z is a multivalent support, and p is an
20 integer in the range of 1-2000.

30. The composition of claim 29 where p is 2-2000 inclusive and where at least
2 one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.

31. The composition of claim 29 where p is 3- 525 inclusive and where at least
2 one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.

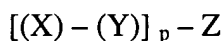
32. The composition of claim 29 having an average of 1-4 sulfur or phosphate
2 containing groups per moiety X.

33. The composition of claim 29 having an average of 2-3 sulfur or phosphate
2 containing groups per moiety X.

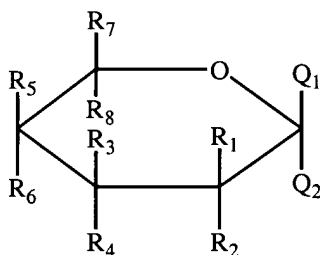
34. The composition of claim 29 wherein Z is a dendrimer.

35. The composition of claim 29 wherein Z is selected from the group consisting
2 of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and
combinations thereof.

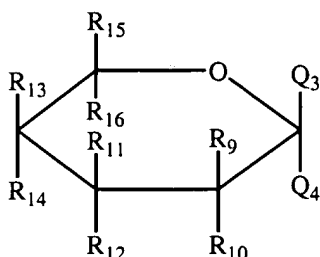
36. A composition comprising:
2 a compound having the formula:



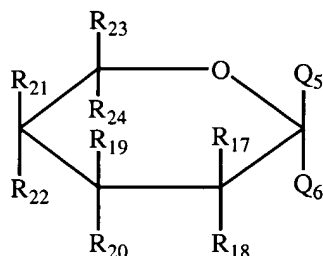
4 where X is



6 where Q1 and Q2 are each independently H or a bond to Y, where at least one of Q1
or Q2 is a bond to Y; and where R1, R2, R3, and R4 are each independently H, OH, COOH,
8 sialic acid, a saccharyl group, OSO3D, or OPO3D; R7 and R8 are each independently H,
OH, COOH, sialic acid, a saccharyl group, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or
10 OPO3D; and R5 and R6 are each independently H or a saccharyl group having the formula:



- 12 where one of the variables Q3 and Q4 is oxygen and the other is H; where R9, R10,
14 R11, and R12 are each independently H, OH, COOH, sialic acid, a saccharyl group, OSO3D,
16 or OPO3D; where R15 and R16 are each independently H, OH, COOH, sialic acid, a
saccharyl group, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or OPO3D; where R13 and
R14 are each independently H or a saccharyl group having the formula:



- 18 where one of the variables Q5 and Q6 is oxygen and the other is H; and where R17,
19 R18, R19, R20, R21 and R22 are each independently a saccharyl group, H, OH, COOH,
20 sialic acid, OSO3D, or OPO3D; and R23 and R24 are each independently a saccharyl group,
H, OH, COOH, sialic acid, CH2OH, CH2OSO3D, CH2OPO3D, OSO3D, or OPO3D; where
22 D is H or a cation selected from the group consisting of: alkali metal cations, alkaline earth
metal cations, ammonium cations, quaternary ammonium cations and amine cations; and
24 where at least one of R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15,
R16, R17, R18, R19, R20, R21, R22, R23 and R24 is a sulfur or phosphate containing group;
26 and where Y is an optional linker, Z is a multivalent support, and p is an integer in the range
of 1-2000.

37. The composition of claim 36 where p is 2-2000 inclusive and where at least
2 one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.

- 2 38. The composition of claim 36 where p is 3- 525 inclusive and where at least
one of R1, R2, R3, R4, R5, R6, R7 and R8 on each X independently is a sulfur or phosphate
containing group.
- 2 39. The composition of claim 36 having an average of 1-4 sulfur or phosphate
containing groups per moiety X.
- 2 40. The composition of claim 36 having an average of 2-3 sulfur or phosphate
containing groups per moiety X.
41. The composition of claim 36 wherein Z is a dendrimer.
- 2 42. The composition of claim 36 wherein Z is selected from the group consisting
of: a protein, a lipid, a carbohydrate, a synthetic polymer, a natural polymer and
combinations thereof.
- 2 43. A pharmaceutical composition comprising a compound according to claim 1;
and
a pharmaceutical carrier or excipient.
- 2 44. A pharmaceutical composition comprising a compound according to claim 8;
and
a pharmaceutical carrier or excipient.
- 2 45. A pharmaceutical composition comprising a compound according to claim
15; and
a pharmaceutical carrier or excipient.

- 2 46. A pharmaceutical composition comprising a compound according to claim
2 22; and
a pharmaceutical carrier or excipient.
- 2 47. A pharmaceutical composition comprising a compound according to claim
2 29; and
a pharmaceutical carrier or excipient.
- 2 48. A pharmaceutical composition comprising a compound according to claim
2 36; and
a pharmaceutical carrier or excipient.
- 2 49. A process for inhibiting interaction of a ligand and a receptor, the process
2 comprising the steps of:
providing a composition as claimed in claim 1; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.
- 2 50. The process of claim 49 wherein the ligand is a virus or a component of a
2 virus.
51. The process of claim 49 wherein the ligand is a cell or a component of a cell.
- 2 52. The process of claim 49 wherein the receptor is a cell or a component of a
2 cell.
- 2 53. The process of claim 50 wherein the virus is a virus of the family
2 Retroviridae.

54. The process of claim 50 wherein the virus is an HIV.
- 2 55. The process of claim 49 wherein the environment is a human or non-human
animal body.
- 4 56. The process of claim 49 wherein the ligand is a sperm cell and the receptor is
an ovum.
- 2 57. The process of claim 49 wherein the receptor is endogenous to the body of an
individual subject and the ligand is exogenous.
- 2 58. A process for inhibiting interaction of a ligand and a receptor, the process
comprising the steps of:
providing a composition as claimed in claim 8; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.
- 2 59. A process for inhibiting interaction of a ligand and a receptor, the process
comprising the steps of:
providing a composition as claimed in claim 15; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.
- 2 60. A process for inhibiting interaction of a ligand and a receptor, the process
comprising the steps of:
providing a composition as claimed in claim 22; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.

61. A process for inhibiting interaction of a ligand and a receptor, the process
2 comprising the steps of:
providing a composition as claimed in claim 29; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.

62. A process for inhibiting interaction of a ligand and a receptor, the process
2 comprising the steps of:
providing a composition as claimed in claim 36; and
4 introducing the composition into an environment containing the ligand or the
receptor, such that interaction of the ligand and the receptor is inhibited by the composition.

63. A process of therapeutic or prophylactic anti-viral treatment, comprising:
2 administering an effective amount of a compound as claimed in claim 1 to an
individual human or non-human animal in need of such therapeutic or prophylactic anti-viral
4 treatment.

64. The process of claim 63 wherein the individual human or non-human animal
2 is at risk of retroviral infection.

65. The process of claim 63 wherein the individual human or non-human animal
2 is infected with a retrovirus.

66. A commercial package comprising:
a composition as claimed in claim 1; and
instructions for use.